Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: (a) An adaptation is _____.

Constants

Part A

An adaptation is _____.

View Available Hint(s) (1)

ANSWER:

- a trait that gives an organism a reproductive advantage in the current environment
- a trait that gives rise to a new species
- an individual's attempt to conform to its environment
- the cause of natural selection
- all of the above

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	91617	92.1%	7.9%	0%	0.9
This Course (michelson01223)	26	30.8%	69.2%	0%	0.7

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
72.2%	all of the above	Only one of the other choices is correct.
16.7%	an individual's attempt to conform to its environment	This would be an acquired characteristic.
5.6%	the cause of natural selection	Adaptations arise by mutation and may become fixed in a population by natural selection.
5.6%	a trait that gives rise to a new species	In general many adaptations must accumulate over time in order to form a new species.

Evolutionary adaptations are inherited characteristics that enhance an organism's ability to survive and reproduce in a particular environment.

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: [[Bloom's Taxonomy: Application/Analysis]] (a) Which statement about variation is true?

Constants

Part A

Which statement about variation is true?

ANSWER:

- All nucleotide variability results in neutral variation.
- All phenotypic variation is the result of genotypic variation.
- All genetic variation produces phenotypic variation.
- All new alleles are the result of nucleotide variability.

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	13978	91.6%	8.4%	0%	0.6
This Course (michelson01223)	27	51.9%	48.1%	0%	0.5

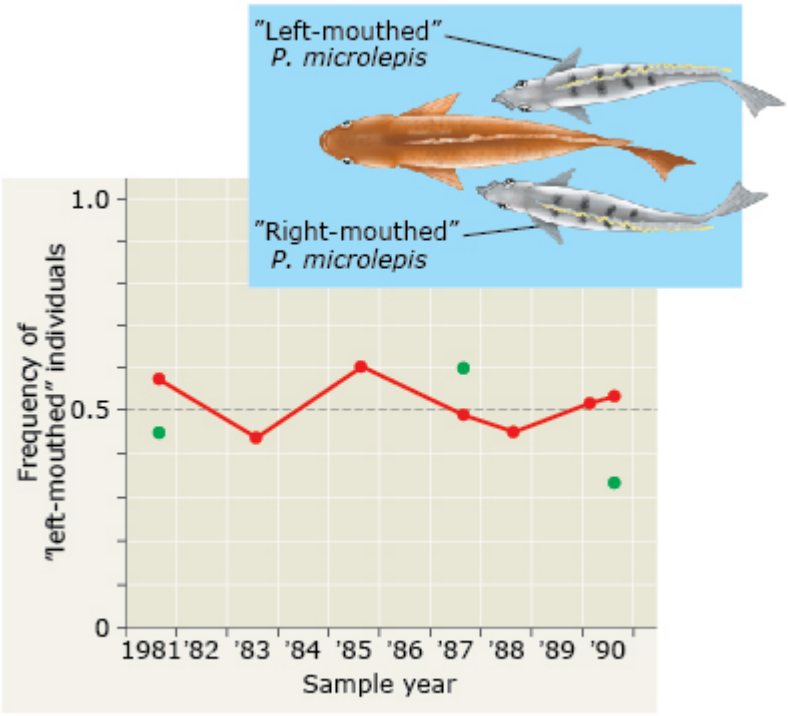
Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
76.9%	All phenotypic variation is the result of genotypic variation.	
23.1%	All genetic variation produces phenotypic variation.	

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: (a) ... (b) ...

Constants



In a population of the scale-eating fish *Perissodus microlepis*, the frequency of left-mouthed individuals (red data points) rises and falls in a regular manner. The frequency of left-mouthed adults that reproduced was also recorded in three sample years (green data points).

Part A

For 1981, 1987, and 1990, how does the frequency of left-mouthed breeding adults compare to the frequency of left-mouthed individuals in the entire population?

ANSWER:

- There is no relationship between the frequency of left-mouthed breeding adults and the frequency of left-mouthed individuals in the entire population.
- Most of the breeding adults had the *same* phenotype as that which was most common in the population.
- Most of the breeding adults had the *opposite* phenotype of that which was most common in the population.
- Most of the breeding adults were left-mouthed.

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	5923	97.1%	2.8%	0.1%	0.5
This Course (michelson01223)	27	51.9%	48.1%	0%	0.5

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
53.8%	There is no relationship between the frequency of left-mouthed breeding adults and the frequency of left-mouthed individuals in the entire population.	Look at the graph again. When the frequency of left-mouthed individuals in the population (red data points) is high, is the frequency of left-mouthed breeding adults (green data points) also high?
38.5%	Most of the breeding adults had the *same* phenotype as that which was most common in the population.	Notice that in 1981 and 1990, when the frequency of left-mouthed individuals (red data points) was higher than 50%, the frequency of left-mouthed breeding adults (green data points) was lower than 50%.
7.7%	Most of the breeding adults were left-mouthed.	In 1981 and 1990, the frequency of left-mouthed breeding adults (green data points) was less than 50%.

When the frequency of left-mouthed individuals (red data points) was *higher* than 50%, the frequency of left-mouthed breeding adults (green data points) was *lower* than 50%. The opposite was also true--when the frequency of left-mouthed individuals was *lower* than 50%, the frequency of left-mouthed breeding adults was *higher* than 50%.

Part B

What do these comparisons suggest about when natural selection favored left-mouthed individuals over right-mouthed individuals?

ANSWER:

- Left-mouthed individuals were always selected against.
- Left-mouthed individuals were selected for when there were more left-mouthed individuals in the population.
- Left-mouthed individuals were always selected for.
- Left-mouthed individuals were selected for when right-mouthed individuals were more common, and vice versa.

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	5924	97.8%	2.1%	0.1%	0.3
This Course (michelson01223)	27	55.6%	44.4%	0%	0.4

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
75%	Left-mouthed individuals were selected for when there were more left-mouthed individuals in the population.	When left-mouthed individuals were more common, they proceeded to decrease in frequency (red data points). This suggests that left-mouthed individuals were selected against when they were more common.
25%	Left-mouthed individuals were always selected for.	If this were the case, then the frequency of left-mouthed individuals should increase continuously over time. This is not what the graph shows. What explains the zig-zag pattern of the red data points?

When left-mouthed individuals were more common, they decreased in frequency (were selected against), and when they were less common, they increased in frequency (were favored by natural selection). This is an example of frequency-dependent selection.

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: [[Bloom's Taxonomy: Synthesis/Evaluation]] (a) Suppose that a group of male pied flycatchers migrated from a region where there were no collared flycatchers to a region where both species were present. Assuming events like this are very rare,...

Constants

Part A

Suppose that a group of male pied flycatchers migrated from a region where there were no collared flycatchers to a region where both species were present. Assuming events like this are very rare, which of the following scenarios is LEAST likely?

ANSWER:

- The frequency of hybrid offspring would decrease.
- Migrant pied males would produce fewer offspring than would resident pied males.
- Pied females would rarely mate with collared males.
- Migrant males would mate with collared females more often than with pied females.

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	1761	85.3%	14.7%	0%	0.6
This Course (michelson01223)	27	55.6%	44.4%	0%	0.4

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
66.7%	Migrant males would mate with collared females more often than with pied females.	
25%	Pied females would rarely mate with collared males.	
8.3%	Migrant pied males would produce fewer offspring than would resident pied males.	

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: [[Bloom's Taxonomy: Application/Analysis]] (a) A swim bladder is a gas-filled sac that helps fish maintain buoyancy. The evolution of the swim bladder from lungs of an ancestral fish is an example of...

Constants

Part A

A swim bladder is a gas-filled sac that helps fish maintain buoyancy. The evolution of the swim bladder from lungs of an ancestral fish is an example of

ANSWER:

- (•) exaptation.
- ( ) adaptive radiation.
- ( ) paedomorphosis.
- ( ) changes in *Hox* gene expression.
- ( ) an evolutionary trend.

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	6795	91.7%	8.2%	0%	0.7
This Course (michelson01223)	27	48.1%	51.9%	0%	0.5

Wrong Answers for This Course (michelson01223)

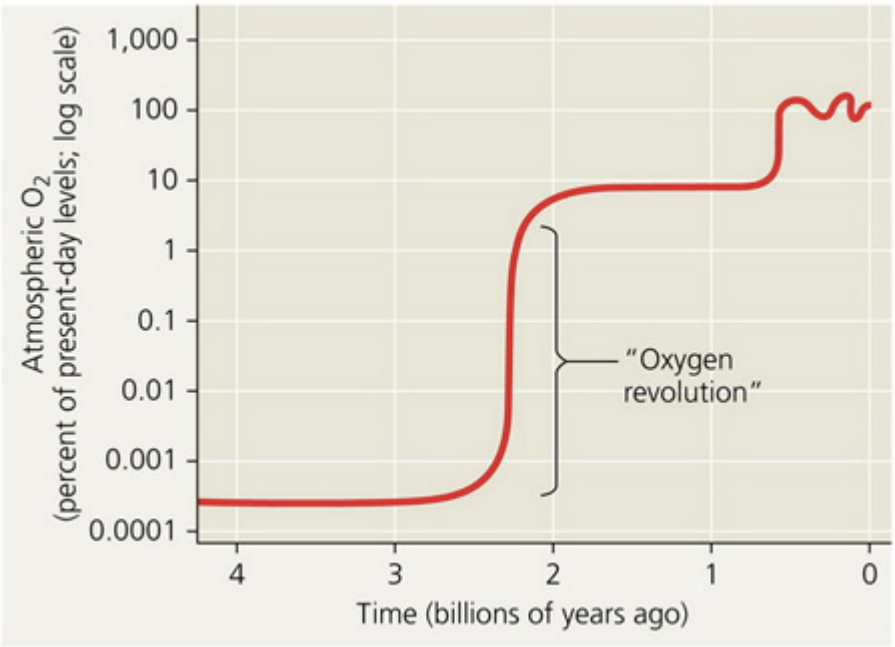
% Wrong	Answer	Response
64.3%	an evolutionary trend.	
21.4%	changes in *Hox* gene expression.	
14.3%	adaptive radiation.	

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: (a) What was the “oxygen revolution,” which took place 2.3 billion years ago?

Constants

Part A



What was the “oxygen revolution,” which took place 2.3 billion years ago?

ANSWER:

- The “oxygen revolution” was the rapid increase in atmospheric oxygen that took place 2.3 billion years ago, dooming many prokaryotic groups.
- The “oxygen revolution” was the rapid increase in atmospheric oxygen that took place 2.3 billion years ago, with the origin of plants.
- The “oxygen revolution” was the rapid increase in atmospheric oxygen that took place 2.3 billion years ago, immediately preceding the origin of animals.

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	15400	96.8%	3.2%	0%	0.6
This Course (michelson01223)	27	37%	63%	0%	0.6

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
76.5%	The “oxygen revolution” was the rapid increase in atmospheric oxygen that took place 2.3 billion years ago, with the origin of plants.	The oxygen revolution took place nearly 2 billion years earlier than the origin of plants; the oxygen was produced by photosynthetic bacteria. Read about photosynthesis and the oxygen revolution.
23.5%	The “oxygen revolution” was the rapid increase in atmospheric oxygen that took place 2.3 billion years ago, immediately preceding the origin of animals.	The oxygen revolution took place nearly 2 billion years earlier than the origin of animals; the oxygen was produced by photosynthetic bacteria. Read about photosynthesis and the oxygen revolution.

Read about photosynthesis and the oxygen revolution.

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: [[Bloom's Taxonomy: Application/Analysis]] (a) Use the following information to answer the question(s) below. Healthy individuals of Paramecium bursaria contain photosynthetic algal endosymbionts of the genus Chlorella. When within their hosts, ...

Constants

Part A

Use the following information to answer the question(s) below.

Healthy individuals of *Paramecium bursaria* contain photosynthetic algal endosymbionts of the genus *Chlorella*. When within their hosts, the algae are referred to as zoochlorellae. In aquaria with light coming from only one side, *P. bursaria* gather at the well-lit side, whereas other species of *Paramecium* gather at the opposite side. The zoochlorellae provide their hosts with glucose and oxygen, and *P. bursaria* provides its zoochlorellae with protection and motility. *P. bursaria* can lose its zoochlorellae in two ways: (1) if kept in darkness, the algae will die; and (2) if prey items (mostly bacteria) are absent from its habitat, *P. bursaria* will digest its zoochlorellae.

Which term most accurately describes the nutritional mode of healthy *P. bursaria*?

ANSWER:

- photoheterotroph
- chemoautotroph
- photoautotroph
- mixotroph

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	2619	88%	12%	0%	0.6
This Course (michelson01223)	27	48.1%	51.9%	0%	0.5

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
57.1%	photoheterotroph	
28.6%	photoautotroph	
14.3%	chemoautotroph	

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: [[Bloom's Taxonomy: Knowledge/Comprehension]] (a) A controlled experiment _____.

Constants

Part A

A controlled experiment _____.

ANSWER:

- ○ includes one group for which the scientist controls all variables
- ○ includes at least two groups, one differing from the other by two or more variables
- ○ is repeated many times to ensure that the results are accurate
- ◉ includes at least two groups, one of which does not receive the experimental treatment

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	16694	88.5%	11.5%	0%	0.5
This Course (michelson01223)	27	77.8%	22.2%	0%	0.2

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
66.7%	includes one group for which the scientist controls all variables	
33.3%	is repeated many times to ensure that the results are accurate	

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: [[Bloom's Taxonomy: Application/Analysis]] (a) Which of the following is not a characteristic that distinguishes gymnosperms and angiosperms from other plants?

Constants

Part A

Which of the following is *not* a characteristic that distinguishes gymnosperms and angiosperms from other plants?

ANSWER:

- alternation of generations
- pollen
- dependent gametophytes
- integuments
- ovules

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	28112	96.9%	3%	0%	0.5
This Course (michelson01223)	27	59.3%	40.7%	0%	0.4

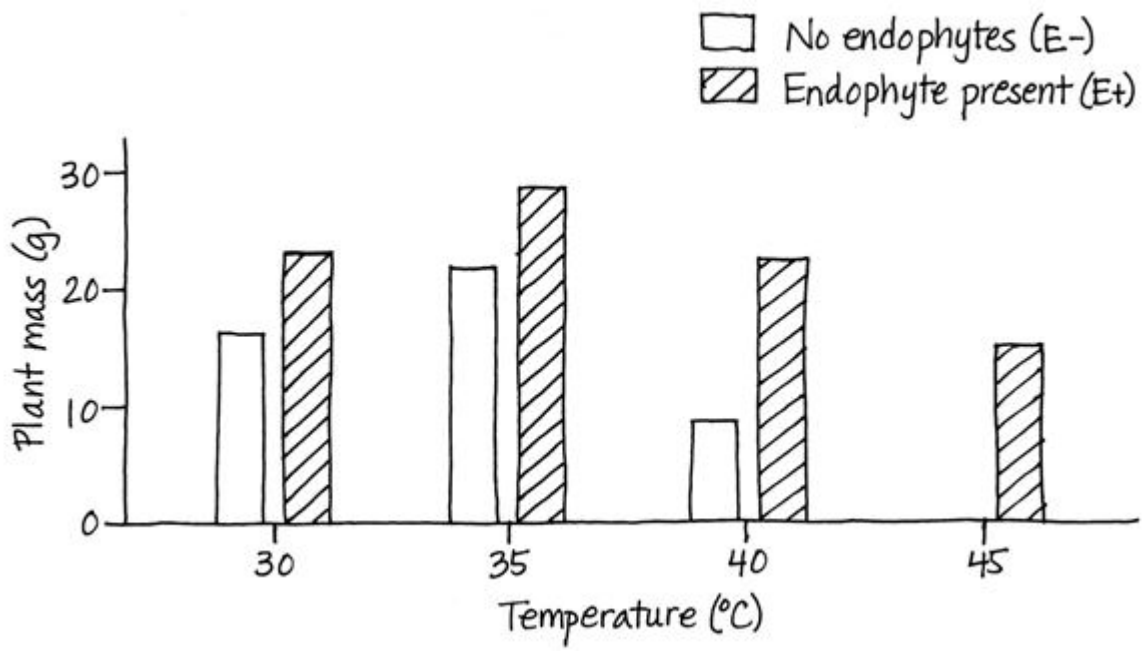
Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
36.4%	pollen	
27.3%	dependent gametophytes	
27.3%	integuments	
9.1%	ovules	

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: (a) ...

Constants



The grass *Dichanthelium languinosum* lives in hot soils and houses fungi of the genus *Curvularia* as endophytes. Researchers tested the impact of *Curvularia* on the heat tolerance of this grass. They grew plants without (E–) and with (E+) *Curvularia* endophytes at different temperatures and measured plant mass and the number of new shoots the plants produced. The table shows their data, and the bar graph illustrates the plant mass data.

Soil temp.	*Curvularia* presence	Plant mass (g)	Number of new shoots
30°C	E–	16.2	32
	E+	22.8	60
35°C	E–	21.7	43
	E+	28.4	60
40°C	E–	8.8	10
	E+	22.2	37
45°C	E–	0	0
	E+	15.1	24

Source: R. S. Redman et al., Thermotolerance generated by plant/fungal symbiosis, *Science* 298:1581 (2002).

Part A

What conclusion can you draw from the data?

ANSWER:

- ○ E+ grass plants grew better than E– grass plants, but only at lower temperatures.
- ◉ E+ grass plants grew better than E– grass plants, with the most pronounced positive effect at higher temperatures.
- ○ E+ grass plants and E– grass plants grew equally well at all temperatures measured.
- ○ E– grass plants grew better than E+ grass plants, with the most pronounced positive effect at lower temperatures.

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	2661	90.9%	9.1%	0.1%	0.4
This Course (michelson01223)	27	66.7%	33.3%	0%	0.3

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
55.6%	E+ grass plants grew better than E– grass plants, but only at lower temperatures.	You're right that E+ grass plants grew better than E– grass plants at lower temperatures, but what about at higher temperatures? Keep in mind that the absence of an E– bar means that E– plants experienced no growth at that temperature.
33.3%	E– grass plants grew better than E+ grass plants, with the most pronounced positive effect at lower temperatures.	Look at the graph again. Keep in mind that plant mass is shown on the *y*-axis, so the taller the bar, the better the growth. Did E– grass plants grow better than E+ grass plants at any temperature?
11.1%	E+ grass plants and E– grass plants grew equally well at all temperatures measured.	Look at the graph again. Keep in mind that plant mass is shown on the *y*-axis, so the taller the bar, the better the growth.

As indicated by the raw data and bar graph, grass plants with endophytes (E+) produced more new shoots and had greater biomass than did grass plants that lacked endophytes (E–). These differences were especially pronounced at the highest soil temperature, where E– grass plants produced no new shoots and had a biomass of zero (indicating they were dead).

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: [[Bloom's Taxonomy: Knowledge/Comprehension]] (a) Which of the following is (are) unique to animals?

Constants

Part A

Which of the following is (are) unique to animals?

ANSWER:

- nervous system signal conduction and muscular movement
- flagellated gametes
- the structural carbohydrate, chitin
- heterotrophy

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	17148	97.5%	2.4%	0.1%	0.2
This Course (michelson01223)	27	81.5%	18.5%	0%	0.2

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
40%	heterotrophy	
40%	the structural carbohydrate, chitin	
20%	flagellated gametes	

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: [[Bloom's Taxonomy: Application/Analysis]] (a) Healthy corals are brightly colored because they _____.

Constants

Part A

Healthy corals are brightly colored because they _____.

ANSWER:

- secrete colorful pigments to protect themselves from ultraviolet light
- host symbionts with colorful photosynthetic pigments
- secrete colorful pigments to attract mates
- build their skeletons from colorful minerals

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	7141	94.3%	5.7%	0%	0.3
This Course (michelson01223)	27	88.9%	11.1%	0%	0.1

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
33.3%	build their skeletons from colorful minerals	
33.3%	secrete colorful pigments to attract mates	
33.3%	secrete colorful pigments to protect themselves from ultraviolet light	

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: [[Bloom's Taxonomy: Application/Analysis]] (a) Use the following information to answer the question(s) below. An elementary school science teacher decided to liven up the classroom with a saltwater aquarium. Knowing that saltwater aquaria can...

Constants

Part A

Use the following information to answer the question(s) below.

An elementary school science teacher decided to liven up the classroom with a saltwater aquarium. Knowing that saltwater aquaria can be quite a hassle, the teacher proceeded stepwise. First, the teacher conditioned the water. Next, the teacher decided to stock the tank with various marine invertebrates, including a polychaete, a siliceous sponge, several bivalves, a shrimp, several sea anemones of different types, a colonial hydra, a few coral species, an ectoproct, a sea star, and several herbivorous gastropod varieties. Lastly, she added some vertebrates–a parrotfish and a clownfish. She arranged for daily feedings of copepods and feeder fish.

The bivalves started to die one by one; only the undamaged shells remained. To keep the remaining bivalves alive, the teacher would most likely need to remove the _____.

ANSWER:

- gastropods
- ectoprocts
- sea anemones
- sea star

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	2733	89.4%	10.6%	0%	0.4
This Course (michelson01223)	26	73.1%	26.9%	0%	0.3

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
85.7%	gastropods	
14.3%	ectoprocts	

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: [[Bloom's Taxonomy: Application/Analysis]] (a) Use the following description to answer the question(s) below. While on an intersession course in tropical ecology, Kris pulls a large, snakelike organism from a burrow (the class was granted a...

Constants

Part A

Use the following description to answer the question(s) below.

While on an intersession course in tropical ecology, Kris pulls a large, snakelike organism from a burrow (the class was granted a collecting permit). The 1-meter-long organism has smooth skin, which appears to be segmented. It has two tiny eyes that are hard to see because they seem to be covered by skin. Kris brings it back to the lab at the field station, where it is a source of puzzlement to the class. Kris says that it is a giant oligochaete worm; Shaun suggests it is a legless amphibian; Kelly proposes it belongs to a snake species that is purely fossorial (lives in a burrow).

The class decided to humanely euthanize the organism and subsequently dissect it. Having decided that it was probably not a reptile, two of their original hypotheses regarding its identity remained. Which of the following, if observed, should help them arrive at a conclusive answer?

ANSWER:

- presence of a digestive system with two openings
- presence of a nerve cord
- presence of moist, highly vascularized skin
- presence of lungs

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	5835	93.3%	6.7%	0%	0.6
This Course (michelson01223)	26	65.4%	34.6%	0%	0.3

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
44.4%	presence of a digestive system with two openings	
33.3%	presence of a nerve cord	
22.2%	presence of moist, highly vascularized skin	

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: [[Bloom's Taxonomy: Synthesis/Evaluation]] (a) Leaf thickness represents a trade-off between _____.

Constants

Part A

Leaf thickness represents a trade-off between _____.

ANSWER:

- light collection and carbon dioxide absorption
- light collection and oxygen absorption
- water retention and oxygen absorption
- water retention and carbon dioxide absorption

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	3588	95%	4.9%	0.2%	0.4
This Course (michelson01223)	26	61.5%	38.5%	0%	0.4

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
60%	water retention and oxygen absorption	
30%	light collection and carbon dioxide absorption	
10%	light collection and oxygen absorption	

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: [[Bloom's Taxonomy: Application/Analysis]] (a) Why is the climate drier on the leeward (downwind) side of mountain ranges that are subjected to prevailing winds?

Constants

Part A

Why is the climate drier on the leeward (downwind) side of mountain ranges that are subjected to prevailing winds?

ANSWER:

- Air masses pushed by the prevailing winds are stopped by mountain ranges and the moisture is used up in the stagnant air masses on the leeward side.
- Pushed by the prevailing winds on the windward side, air is forced to rise, cool, condense, and drop its precipitation, leaving drier air to descend the leeward side.
- The sun illuminates the leeward side of mountain ranges at a more direct angle, converting to heat energy, which evaporates most of the water present.
- Deserts create dry conditions on the leeward side of mountain ranges.

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	6710	97.2%	2.7%	0.1%	0.2
This Course (michelson01223)	25	68%	32%	0%	0.3

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
37.5%	Air masses pushed by the prevailing winds are stopped by mountain ranges and the moisture is used up in the stagnant air masses on the leeward side.	
37.5%	The sun illuminates the leeward side of mountain ranges at a more direct angle, converting to heat energy, which evaporates most of the water present.	
25%	Deserts create dry conditions on the leeward side of mountain ranges.	

Note: Answer statistics on this page are updated periodically. Statistics were last updated June 2, 2018 at 12:26 am.

Description: Student perception of assessment questions

Constants

Part A

I feel confident discussing the biology of plants, animals, and other biota with other people.

ANSWER:

- ○ Strongly Agree
- ○ Agree
- ◉ Neither Agree or Disagree
- ○ Disagree
- ○ Strongly Disagree

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	121	26.4%	73.6%	0%	0.7
This Course (michelson01223)	23	13%	87%	0%	0.9

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
55%	Agree	
40%	Strongly Agree	
5%	Disagree	

Part B

I feel confident in my lab skills including dissection and examining specimens with microscopes.

ANSWER:

- ○ Strongly Agree
- ○ Agree
- ◉ Neither Agree or Disagree
- ○ Disagree
- ○ Strongly Disagree

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	121	15.7%	84.3%	0%	0.8
This Course (michelson01223)	23	8.7%	91.3%	0%	0.9

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
66.7%	Strongly Agree	
33.3%	Agree	

Part C

I feel confident in my ability to conduct library research and summarize and present my information.

ANSWER:

- ○ Strongly Agree
- ○ Agree
- ◉ Neither Agree or Disagree
- ○ Disagree
- ○ Strongly Disagree

Answer Stats:	Students	% Correct	% Unfinished	% Req'd Solution	Wrong/s
System Average	122	5.7%	94.3%	0%	0.9
This Course (michelson01223)	23	13%	87%	0%	0.9

Wrong Answers for This Course (michelson01223)

% Wrong	Answer	Response
65%	Strongly Agree	
40%	Agree	